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Report of the individual review of the annual submission of Austria submitted in 2013*

* In the symbol for this document, 2013 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Introduction and summary

1. This report covers the review of the 2013 annual submission of Austria, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 30 September to 5 October 2013 in Vienna, Austria, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Ms. Helen Plume (New Zealand); energy – Mr. Jongikhaya Witi (South Africa); industrial processes and solvent and other product use – Ms. Laura Dawidowski (Argentina); agriculture – Ms. Tajda Mekinda-Majaron (Slovenia); land use, land-use change and forestry (LULUCF) – Mr. Kevin Black (Ireland); and waste – Mr. Chart Chiemchaisri (Thailand). Ms. Dawidowski and Ms. Mekinda-Majaron were the lead reviewers. The review was coordinated by Mr. Bernd Hackmann and Mr. Vitor Gois Ferreira (UNFCCC secretariat).

2. In accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines), a draft version of this report was communicated to the Government of Austria, which provided comments that were considered and incorporated, as appropriate, into this final version of the report. All encouragements and recommendations in this report are for the next annual submission, unless otherwise specified.

3. In 2011, the main greenhouse gas (GHG) in Austria was carbon dioxide (CO_2), accounting for 85.0 per cent of total GHG emissions[1] expressed in CO_2 equivalent (CO_2 eq), followed by methane (CH_4) (6.5 per cent) and nitrous oxide (N_2O) (6.4 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 2.1 per cent of the overall GHG emissions in the country. The energy sector accounted for 74.8 per cent of total GHG emissions, followed by the industrial processes sector (13.6 per cent), the agriculture sector (9.1 per cent), the waste sector (2.1 per cent) and the solvent and other product use sector (0.4 per cent). Total GHG emissions amounted to 82,843.87 Gg CO_2 eq and increased by 6.0 per cent between the base year[2] and 2011. The expert review team (ERT) concludes that the description in the national inventory report (NIR) of the trends for the different gases and sectors is reasonable.

4. Tables 1 and 2 show GHG emissions from sources included in Annex A to the Kyoto Protocol (hereinafter referred to as Annex A sources), emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, elected activities under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively. In table 1, CO_2, CH_4 and N_2O emissions included in the rows under Annex A sources do not include emissions and removals from the LULUCF sector.

5. Additional background data on recalculations by Austria in the 2013 annual submission, as well as information to be included in the compilation and accounting database, can be found in annex I to this report.

[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified.

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The base year emissions include emissions from sources included in Annex A of the Kyoto Protocol only.

Table 1

Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, by gas, base year[a] to 2011

			Gg CO_2 eq								*Change (%)*
		Greenhouse gas	*Base year[a]*	*1990*	*1995*	*2000*	*2008*	*2009*	*2010*	*2011*	*Base year–2011*
Annex A sources		CO_2	62 059.59	62 059.59	63 943.97	65 969.68	73 921.74	67 396.95	72 590.80	70 455.49	13.5
		CH_4	8 305.68	8 305.68	7 619.60	6 624.85	5 708.02	5 627.01	5 538.02	5 363.98	–35.4
		N_2O	6 197.91	6 197.91	6 606.11	6 289.10	5 695.25	5 414.02	5 184.34	5 293.79	–14.6
		HFCs	22.55	22.55	339.64	646.82	1 082.02	1 134.26	1 285.65	1 349.01	5 882.3
		PFCs	1 079.24	1 079.24	68.39	67.46	167.13	28.64	63.93	60.07	–94.4
		SF_6	493.37	493.37	1 153.20	602.25	390.87	357.54	351.50	321.53	–34.8
KP-LULUCF	Article 3.3[b]	CO_2					–1 126.84	–1 230.64	–1 258.85	–1 287.06	
		CH_4					NO	NO	NO	NO	
		N_2O					0.19	0.21	0.21	0.22	
	Article 3.4[c]	CO_2	NA				NA	NA	NA	NA	NA
		CH_4	NA				NA	NA	NA	NA	NA
		N_2O	NA				NA	NA	NA	NA	NA

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable, NO = not occurring.

[a] "Base year" for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The "base year" for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1990. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[c] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

Table 2
Greenhouse gas emissions by sector and activity, base year[a] to 2011

			Gg CO_2 eq							*Change (%)*
		Sector	*Base year[a]*	*1990*	*1995*	*2000*	*2008*	*2009*	*2010*	*2011*	*Base year–2011*
Annex A		Energy	55 398.83	55 398.83	57 671.63	59 248.09	64 977.24	60 358.65	64 609.22	61 987.31	11.9
		Industrial processes	10 103.72	10 103.72	9 820.76	10 058.92	11 936.68	9 755.23	10 807.16	11 246.95	11.3
		Solvent and other product use	511.80	511.80	422.45	425.12	367.24	299.16	327.12	324.20	–36.7
		Agriculture	8 556.70	8 556.70	8 719,60	7 909.85	7 653.97	7 634.11	7 466.75	7 577.10	–11.4
		Waste	3 587.28	3 587.28	3 096,47	2 558.17	2 029.90	1 911.26	1 804.00	1 708.31	–52.4
		LULUCF	NA	–9 926.54	–11 499.84	–14 935.76	481.34	–3 540.02	–3 517.69	–3 491.28	NA
		Total (with LULUCF)	**NA**	**68 231.79**	**68 231.07**	**65 264.38**	**87 446.36**	**76 418.40**	**81 496.56**	**79 352.60**	**NA**
		Total (without LULUCF)	**78 158.34**	**78 158.34**	**79 730.90**	**80 200.15**	**86 965.03**	**79 958.42**	**85 014.25**	**82 843.87**	**6.0**
		Other[b]	NA	NA	NA	NA	NA	NA	NA	NA	NA
KP-LULUCF	Article 3.3[c]	Afforestation and reforestation					–2 488.47	–2 608.25	–2 620.86	–2 633.46	
		Deforestation					1 364.49	1 380.67	1 365.13	1 349.59	
		Total (3.3)					**–1 123.98**	**–1 227.58**	**–1 255.73**	**–1 283.87**	
	Article 3.4[d]	Forest management					NA	NA	NA	NA	
		Cropland management	NA				NA	NA	NA	NA	NA
		Grazing land management	NA				NA	NA	NA	NA	NA
		Revegetation	NA				NA	NA	NA	NA	NA
		Total (3.4)	**NA**				**NA**	**NA**	**NA**	**NA**	NA

Abbreviations: KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable.

[a] "Base year" for sources included in Annex A to the Kyoto Protocol refers to the base year under the Kyoto Protocol, which is 1990 for all gases. The "base year" for cropland management, grazing land management and revegetation under Article 3, paragraph 4, of the Kyoto Protocol is 1990. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Emissions/removals reported in the sector other (sector 7) are not included in Annex A to the Kyoto Protocol and are therefore not included in national totals.

[c] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[d] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

6. The 2013 annual inventory submission was submitted on 15 April 2013; it contains a complete set of common reporting format (CRF) tables for the period 1990–2011 and an NIR. Austria also submitted the information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry, and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 15 April 2013. The annual submission was submitted in accordance with decision 15/CMP.1.

7. Austria officially submitted revised emission estimates on 18 November 2013 in response to the list of potential problems and further questions raised by the ERT. All values in this report are based on the submission of revised estimates submitted on 18 November 2013.

8. The full list of materials used during the review is provided in annex II to this report.

2. Overall assessment of the inventory

9. Table 3 contains the ERT's overall assessment of the annual submission of Austria. For recommendations for improvements related to cross-cutting issues for specific categories, please see the paragraphs cross-referenced in the table.

Table 3
The expert review team's overall assessment of the annual submission

		General findings and recommendations
The expert review team's (ERT's) findings on completeness of the 2013 annual submission		
Annex A sources[a]	Complete	Mandatory: None
		Non-mandatory: "NE" is reported for potential emissions of halocarbons and SF6 in products for export: HFC-23, HFC-32, HFC-125, HFC-134a, HFC-143a and HFC-153a
Land use, land-use change[a] and forestry (LULUCF)	Not complete	Mandatory: Forest land remaining forest land (see para. 60 below)
		Non-mandatory: "NE" is reported for: all pools for wetlands remaining wetlands; all pools except dead organic matter for settlements remaining settlements; and harvested wood products
KP-LULUCF	Not complete	"IE" is reported for afforestation and reforestation (see para. 77 below) and "NE" is

		General findings and recommendations
		reported for deforestation (see para. 79 below)
The ERT's findings on recalculations and time-series consistency in the 2013 annual submission	Generally consistent	Improve time series consistency for CH_4 emissions from oil and natural gas in the energy sector (see para. 38 below) and N_2O emissions from manure management(see para 53 below)
The ERT's findings on verification and quality assurance/quality control (QA/QC) procedures in the 2013 annual submission	Sufficient	QA/QC could be improved by carrying out some further checks to reduce future inconsistencies or incorrect omissions in the use of the notation keys and the use of out-of-date information in the background tables (see paras. 25 and 50 below)
The ERT's findings on the transparency of the 2013 annual submission	Generally sufficient	Transparency could be further improved through the provision of clearer descriptions of any models used (e.g. for LULUCF) (see para. 57 below) and by more clearly reflecting in the national inventory report how recommendations made in previous review reports have been addressed (see para. 17 below). Additional category-specific recommendations can be found in paragraphs 28, 34, 49, 50, 51, 52, 56, 62, 66, 69 and 87 below

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NE = not estimated.

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

3. Description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Inventory planning

10. The NIR and additional information provided by the Party during the review, described the national system for the preparation of the inventory. Austria's reporting obligations to the UNFCCC are administered by the Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW). By the Environmental Control Act that entered into force on 1 January 1999, the Austrian Federal Environment Agency (Umweltbundesamt) was designated as the single national entity with overall responsibility for the national inventory. Inventory responsibilities are divided by sector (and between sectoral experts) from departments within the Umweltbundesamt. A particular strength of the national system is that each sector has two experts that have responsibility for compiling the inventory, ensuring that there is sufficient capacity for the timely performance of the functions of the national system.

11. Other legal and institutional arrangements are in place as part of the national system. In particular, the Austrian statistical office (Statistik Austria) is required, by contract with BMLFUW and the Federal Ministry of Economy, Family and Youth (BMWFJ), to annually prepare the national energy balance. It also has to prepare annual import/export statistics,

production statistics and livestock statistics, providing an important basis for estimating emissions from the industrial processes, solvent and other product use and agriculture sectors. Under the Federal Statistics law (Bundesstatistikgesetz; Federal Law Gazette I No. 163/1999), it is possible for the Umweltbundesamt to obtain confidential data in order to comply with the Party's reporting obligations. In addition, experts from Austria's Forest Research Institute are involved in preparing the inventory for the LULUCF sector. Furthermore, for the industrial processes sector there is a close cooperative relationship with industry associations regarding the provision of data useful for compiling the inventory.

12. An important component of Austria's national system is the focus on quality through the quality management system (which has accreditation according to the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) as ISO/IEC 17020) and which is described in a quality manual. The ISO accreditation provides evidence of an efficient quality management system and of the technical competence, independence, impartiality and integrity of the experts involved in the production of the national GHG inventory.

13. Embedded within the quality management system is the quality assurance/quality control (QA/QC) plan, with QA/QC activities set out in quality and technical procedures that complement the quality manual, including QC activities, procedures for choosing methodologies, procedures for subcontracting, the inventory improvement plan, procedures for documentation and archiving, and information on the treatment of confidential data. The ERT commends Austria for its focus on quality in the operation of its national system, through its quality management system and QA/QC plan. However, there are some inconsistencies in the Party's use of the notation keys (e.g. in the energy and agriculture sectors; see paras. 25 and 50 below, respectively) and the ERT recommends that Austria carry out some additional checks to reduce future inconsistencies or omissions in the use of the notation keys.

Inventory preparation

14. Table 4 contains the ERT's assessment of Austria's inventory preparation process. For improvements related to specific categories, please see the paragraphs cross-referenced in the table.

Table 4
Assessment of inventory preparation by Austria

		General findings and recommendations
Key category analysis		
Was the key category analysis performed in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF)?	Yes	Level and trend key category analysis is performed, including and excluding LULUCF
Approach followed?	Tier 1 and tier	Tier 2 was used for the first time for the

		General findings and recommendations
	2	2012 annual submission
Were additional key categories identified using a qualitative approach?	No	Austria applied the following quality criteria: mitigation techniques; high expected growth of emissions/removals; unexpected low or high emission levels; and high uncertainty
Has Austria identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory?	Yes	All activities under Article 3, paragraph 3, of the Kyoto Protocol are key categories
Does Austria use the key category analysis to prioritize inventory improvements?	Yes	
Are there any changes to the key category analysis in the latest submission?	Yes	A comparison of the results of the tier 1 and tier 2 key category analyses in 2013 led to the following additional categories being identified as key: N_2O emissions from biomass use in public electricity and heat production; N_2O emissions from gasoline use in road transportation; CH_4 emissions from the use of solid fuels in residential; fugitive CH_4 emissions from oil; CH_4 and N_2O emissions from manure management for swine; N_2O emissions from manure management for poultry; and CH_4 emissions from wastewater handling
Assessment of uncertainty analysis		
Approach followed?	Tier 1 and tier 2	
Was the uncertainty analysis carried out in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	No	Uncertainty analysis was carried out on the key categories; instead the analysis was carried out for the inventory as a whole, as indicated in the IPCC good practice guidance. The ERT strongly recommends that Austria perform an uncertainty analysis on all the categories of the inventory Noting that the inclusion of LULUCF in the uncertainty analysis results in a much higher overall combined uncertainty, the ERT encourages Austria to take this into account when prioritizing resources for inventory improvements (see para. 59 below). Regarding KP-LULUCF activities,

	General findings and recommendations
	see paragraph 75 below
Quantitative uncertainty (including LULUCF)	Level = 22.7% (tier 1) Trend = 2.8%
Quantitative uncertainty (excluding LULUCF)	Level = 4.5% (tier 1) Trend = 2.2%

Abbreviations: ERT = expert review team, KP-LULUCF = land use, land-use change and forestry emissions and removals for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry.

Inventory management

15. Austria has a centralized archiving system, which is held by the Umweltbundesamt. The archiving system stores all relevant data used for inventory preparation, such as methodologies, statistics, scientific or technical studies, relevant information sent by e-mail and calculation files, together with documentation on assumptions, sources of data and information and expert judgements, in order to allow the full reproduction and understanding of the choices made in compiling the inventory. It includes the archiving of disaggregated emission factors (EFs) and activity data (AD), and documentation on how these factors and data have been generated and aggregated for the preparation of the inventory. The archived information also includes internal documentation on QA/QC procedures, external and internal reviews, and documentation on annual key categories and key category identification and planned inventory improvements. Most of the archive is electronic, but some information from early in the inventory development process is only available in hard copy. During the review, the ERT was provided with the requested additional archived information.

4. Follow-up to previous reviews

16. Austria's NIR includes a section on improvements made to the inventory in response to the review process (covering both the 2011 and 2012 annual review reports), including presenting the information in a table (table 275 in section 9.4 of the NIR). Major improvements include: a corrected national energy balance, which resulted in the revision of AD and hence the recalculation of the estimated emissions from the energy sector; and improved transparency across all sectors in response to previous reviews.

17. In response to a request from the ERT before the review week, Austria provided an annotated version of table 6 (recommendations identified by the ERT) from the 2012 annual review report, clearly indicating where in the 2013 NIR the specific recommendations had been addressed. This greatly facilitated the review during the review week and the ERT recommends that Austria provide this level of detail in the NIR (using table 8 of this annual review report as a basis). This would increase the transparency of the information provided in the NIR concerning the follow-up to recommendations made in previous review reports and facilitate its review.

18. In providing the information requested by the ERT as described in paragraph 17 above, Austria indicated where improvements are ongoing (e.g. in relation to a range of issues in the LULUCF sector (as well as KP-LULUCF) that are scheduled to be addressed in the preparation of the 2014 annual submission (see para. 72 below). The ERT welcomes these improvements.

19. The ERT, however, strongly reiterates the following recommendations from previous review reports that Austria: improve the data and methodologies used for the calculation of activities under Article 3, paragraph 3, of the Kyoto Protocol using best available data and ensure that the time-series data for the first commitment period are reconstructed to meet the reporting requirements in decision 16/CMP.1 (see para. 76 below); and provide estimates for the deadwood pool or demonstrate that the pool is not a source.

5. Areas for further improvement identified by the expert review team

20. During the review, the ERT identified a number of areas for improvement, including some related to specific categories. These are listed in the relevant chapters of this report and in table 8.

B. Energy

1. Sector overview

21. The energy sector is the main sector in the GHG inventory of Austria. In 2011, emissions from the energy sector amounted to 61,987.31 Gg CO_2 eq, or 74.8 per cent of total GHG emissions. Since 1990, emissions have increased by 11.9 per cent. The key drivers for the rise in emissions are the strong increase in emissions from road transportation and the increase in gas and biomass use in manufacturing industries and construction. Within the sector, 35.1 per cent of the emissions were from transport, followed by 24.2 per cent from manufacturing industries and construction, 22.6 per cent from energy industries and 17.3 per cent from other sectors. Fugitive emissions from fuels (almost all oil and natural gas) accounted for 0.8 per cent. The remaining 0.1 per cent were from the sub-category "other".

2. Reference and sectoral approaches

22. Table 5 provides a review of the information reported under the reference approach and the sectoral approach, as well as comparisons with other sources of international data. Issues identified in table 5 are more fully elaborated in paragraphs 23–27 below.

Table 5
Review of reference and sectoral approaches

		Paragraph cross-references
Difference between the reference approach and the sectoral approach	Energy consumption: –19.74 PJ, –2.25% CO_2 emissions: 3741.10 Gg CO_2 eq, 6.17%	23 - 25
Are differences between the reference approach and the sectoral approach adequately explained in the NIR and the CRF tables?	Yes	23
Are differences with international statistics adequately explained?	Yes	25
Is reporting of bunker fuels in accordance with the UNFCCC reporting guidelines?	Yes	26

		Paragraph cross-references
Is reporting of feedstocks and non-energy use of fuels in accordance with the UNFCCC reporting guidelines?	Yes	27

Abbreviations: CRF = common reporting format, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

Comparison of the reference approach with the sectoral approach and international statistics

23. The difference between the two approaches varies across the time series, from 3.9 per cent in 2004 to 8.0 per cent in 1998. Explanations for the fluctuations in the difference between the two approaches over the time series are provided in the NIR, with a detailed quantification of the differences. The differences are attributed to the reference approach's inclusion of process emissions from blast furnace gas and steel production for solid fuels, emissions from plastic waste incineration for liquid fuels and the full accounting of emissions from diesel and gasoline as fossil emissions, while the sectoral approach treats the share of mixed biofuels as biogenic, considers waste as an additional fuel type and uses sector/plant-specific net calorific values. When all such factors are considered, the actual difference between the sectoral and reference approaches is reduced to 0.8 per cent for 2011. The ERT agrees with the analysis conducted by Austria and acknowledges the level of detail provided in the NIR to explain the differences.

24. Specifically, the ERT notes that in CRF table 1.A(c) the difference in energy consumption for liquid fuels between the reference and sectoral approaches is 1.9 per cent. In its NIR, Austria reported that this difference is largely attributed to the reference approach treating the mix of diesel and gasoline with biofuels as full fossil carbon. In response to a question raised by the ERT during the review, Austria explained that the way to address this problem would be to calculate the carbon content of gasoil and diesel oil in the reference approach in such a way that biofuels are considered for 2005 onwards, whereby biogenic carbon from biofuels is accounted for separately. For 2011, an 8.5 per cent share of biofuels in diesel oil would lead to a carbon content of 18.78 t carbon (C)/TJ instead of the current 20.20 t C/TJ. During the review, Austria provided information showing that if such an approach were followed, the difference between the reference and sectoral approaches for liquid fuels would be significantly lower than for the years 2005–2011. The ERT notes such information provided by Austria and recommends that Austria report, in its next annual submission, the carbon content of gasoil and diesel oil in the reference approach in such a way that biofuels are considered from the year 2005 onwards, whereby biogenic carbon from biofuels is accounted for separately.

25. Austria reported jet kerosene consumption for civil aviation of 659.77 TJ for 2011 and used a bottom-up approach to estimate fuel consumption, whereas a figure of 1,505 TJ was noted in the International Energy Agency (IEA) data, building on a top-down approach based on fuel consumption statistics reported by Statistik Austria. The ERT observed that, even though there are methodological differences in how fuel consumption is estimated, the difference of 128.1 per cent is significant. In response to a question raised by the ERT during the review, Austria explained that the IEA data for civil aviation include domestic military fuel use, which is reported by the Party under mobile (other). Furthermore, an analysis undertaken by Austria during the review week showed that, for 2011, the total jet kerosene consumption for civil aviation and mobile (other) is 5.0 per cent lower than the IEA data. For the years 1990–2010, the difference is between –1.9 and +2.2 per cent. The ERT notes that the bottom-up approach used to estimate jet kerosene consumption for civil

aviation in Austria allows for the separation of fuel consumption for civil aviation and domestic military fuel use and should be used to calibrate fuel consumption use in the top-down approach. In response to a question raised by the ERT during the review, Austria explained that it plans to work closely with Statistik Austria to harmonize the IEA data with the reported bottom-up approach it has used to estimate fuel consumption. Similarly, the plan is to do the same for the use of diesel oil in navigation. The ERT welcomes such an initiative and recommends that Austria report the results of that harmonization exercise in its NIR.

International bunker fuels

26. Since 2010, Austria has reported emissions from waterborne navigation separately from maritime bunker consumption, estimated using a bottom-up fuel consumption methodology that accounts for tonne-kilometres travelled for freight transport. Diesel oil consumption for navigation was reported as 38.56 TJ for 2011, while a figure of 426 TJ was noted in the IEA data for navigation. For marine bunkers, diesel oil consumption of 592.93 TJ was reported in CRF table 1.C, whereas a figure of 0 TJ was observed in the IEA data. The ERT noted that the IEA top-down approach allocates most diesel oil consumption to navigation, whereas Austria's bottom-up approach allows for the separation of diesel oil consumption for navigation from that for marine bunkers. In response to a question raised by the ERT during the review, Austria explained that it plans to work closely with Statistik Austria to ensure that the bottom-up and top-down approaches used for estimating fuel consumption in relation to international bunker fuels (navigation and aviation) are harmonized. The ERT welcomes such an approach and recommends that Austria report on the progress made in that initiative in its NIR.

Feedstocks and non-energy use of fuels

27. No problems were identified.

3. Key categories

Stationary combustion – liquid, solid and biomass fuels – CO_2, CH_4 and N_2O[3]

28. The ERT noted that the reporting on CO_2 emissions from blast furnace gas and use of residual fuel and coke production in iron and steel production was not transparently reported in the energy sector subcategories manufacture of solid fuels and other energy industries, manufacturing industries and construction, and solid fuel transformation. This lack of transparency prevented the ERT from assessing whether there had been a potential underestimation or overestimation of emissions and whether the estimates are in line with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance). In response to a question raised by the ERT during the review, the Party provided its mass balance approach for 2011 and demonstrated how all of the inputs and outputs in the iron and steel production processes and the carbon flows are accounted for in the energy and industrial processes sectors and reported in the CRF tables. Austria also demonstrated how it validates carbon emission data from the European Union's Emission Trading System (EU ETS) with data received from Statistik Austria. The ERT noted that the prepared mass balance and the verification procedure demonstrated no potential underestimation of emissions. The ERT welcomes Austria's effort and strongly

[3] Not all emissions related to all gases under this category are key categories, particularly N_2O emissions from biomass. However, since the calculation procedures for issues related to this category are discussed as whole, the individual gases are not assessed in separate sections.

recommends that the Party include the carbon mass balance in the form of a process flow diagram in its NIR.

29. The ERT observed that CH_4 emissions from coke production in iron and steel production are reported under manufacturing industries and construction. The ERT notes that, in line with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), CH_4 emissions from coke production should be reported under manufacture of solid fuels and other energy industries. Therefore, the ERT recommends that Austria report emissions from coke production separately under manufacture of solid fuels and other energy industries. Austria provided comments to a draft version of this report and explained that, in line with the Revised 1996 IPCC Guidelines, in modern coke ovens CH_4 from coke production is typically collected and used as a fuel source, which is the case in Austria. The ERT agrees with this assessment and recommends that Austria transparently report this information in its next annual submission and use the appropriate notation key "IE" (included elsewhere).

30. In its original 2013 annual submission Austria did not report emissions associated with charcoal use. However, upon further investigation, the ERT noted that data from the Statistics Division (FAOSTAT)[4] of the Food and Agriculture Organization of the United Nations (FAO) contain official statistics on charcoal imports and exports for Austria. According to the FAOSTAT data, Austria's charcoal imports amounted to 11,808 t in 2011. In response to questions raised by the ERT prior to the review, Austria confirmed that charcoal is used and reflected in the country's energy balance and that all emissions from biomass combustion, including charcoal, are considered under the category other sectors – residential. However, further investigation of the energy data sets by the ERT and Austria during the review week showed that such charcoal consumption is not included under biomass use.

31. The ERT also noted that the Revised 1996 IPCC Guidelines contain EFs for charcoal for CH_4 (table 1-7 in volume 3) and N_2O (table 1-8 in volume 3). In response to the list of potential problems and further questions raised by the ERT, the Party submitted revised estimates of CH_4 and N_2O emissions from charcoal consumption, calculated using data from the IEA joint questionnaire collected for the period 1990–2011 and by applying the default EFs from the Revised 1996 IPCC Guidelines. The calculations resulted in an increase in the estimated biomass-related CH_4 emissions for other sectors – residential, from 163.62 Gg CO_2 eq to 165.06 Gg CO_2 eq for 2011, and also resulted in minor changes to the estimated N_2O emissions. The ERT agrees with the revised estimates and recommends that the Party transparently document the methods used to estimate CH_4 and N_2O emissions from charcoal use in its NIR.

Road transportation – CO_2, CH_4 and N_2O[5]

32. The ERT noted that the road transportation emissions modelling framework presented by Austria during the review is robust and verified and takes into account a significant number of parameters in estimating emissions from road transportation. The model inputs include: vehicle stock, number of passengers per vehicle, tonnes of payload per vehicle, average kilometres per vehicle and year. The model in turn calculates: kilometres driven per vehicle and year or fuel consumption, total vehicle mileages, total passenger kilometres and tonne-kilometres, and specific emission values for the vehicle fleets. The modelling framework is transparently presented and explained in the NIR.

[4] <http://faostat.fao.org>.

[5] Not all emissions related to all gases under this category are key categories, particularly CH_4 and N_2O emissions. However, since the calculation procedures for issues related to this category are discussed as whole, the individual gases are not assessed in separate sections.

33. The modelling framework attempts to account for all fuel consumption emissions from mobile activities, but does not account for fuel consumption and related emissions from ground activities at domestic airports and harbours within Austria. In response to a question raised by the ERT during the review, Austria confirmed that mobile equipment at airports and harbours is not covered by Austria's inland road transport fleet model (GLOBEMI) or by its off-road transport model (GEORG). Austria further explained that, after calculating fuel consumption for inland road transport and off-road transport using a bottom-up approach, it compares the sum of the fuel used with the total fuel sold from the energy balance. The difference is allocated to fuel export, which includes fuel consumption for ground activities at airports and harbours, including fuel consumption by unregistered vehicles. The ERT notes that fuel consumption reported under fuel export is included in the national totals and therefore this does not lead to an underestimation. The ERT agrees with Austria's assessment and recommends that the Party include the relevant explanation in its NIR.

4. Non-key categories

Road transportation – CH_4 and N_2O

34. CH_4 and N_2O emissions associated with liquefied petroleum gas (LPG), gaseous fuels and biomass use under road transportation are reported as included elsewhere ("IE"). In response to a question raised by the ERT during the review, Austria clarified that the country-specific CH_4 and N_2O EFs are based on measurements which do not allow the emissions to be split between the biomass part and the fossil diesel part. Therefore, for compressed natural gas (CNG) and LPG all CH_4 and N_2O emissions are estimated and reported (under gasoline), and in the case of biomass all CH_4 and N_2O emissions are estimated and reported under gasoline and diesel oil. The ERT considers that, even though total emissions are accounted for, the modelling approach reduces transparency. The ERT therefore recommends that Austria revise the modelling approach used to allow for the estimation of CH_4 and N_2O emissions from biomass separately and to report thereon in its annual submission.

Coal mining and handling – CH_4

35. Regarding fugitive CH_4 emissions from solid fuels, Austria reported that coal mining in the country stopped in 2007. However, the ERT noted that CH_4 emissions are likely to occur even after production has stopped. In response to a question raised by the ERT during the review, Austria indicated that it is in the process of compiling a trial GHG inventory that follows the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines). Within the framework of that project the inventory team is in contact with BMWFJ (Statistics on Raw Materials Division) to gather data on abandoned coal mines, and Austria plans to estimate CH_4 emissions from abandoned underground coal mines once it has started to conduct its reporting in accordance with the 2006 IPCC Guidelines. Austria also indicated that an initial estimate indicates that emissions from abandoned underground mines would be in the range of 1 Gg CH_4 annually. The ERT welcomes Austria's initiative and encourages the Party to report the results thereof.

Solid fuel transformation: biomass – CH_4

36. The ERT noted that fugitive CH_4 emissions from charcoal production were not reported in Austria's original 2013 annual submission for the whole time series. Upon further investigation the ERT also noted that FAOSTAT reports official data on charcoal production in Austria in 2011, amounting to 1,183 t charcoal produced. In response to a question raised by the ERT during the review week, Austria confirmed that there are a few

small charcoal plants in the country and that Statistik Austria estimates charcoal produced in the country to account for about 10 per cent of the total domestic use of charcoal, while the remaining domestic demand is met by charcoal imports. According to Austria, that estimate is based on the fact that charcoal production data are mostly collected for the purpose of monitoring air quality, with an interest in estimating particulate matter.

37. The ERT further noted that the Revised 1996 IPCC Guidelines (table 1-14) contain default CH_4 EFs for charcoal production. In response to the list of potential problems and further questions raised by the ERT, the Party estimated emissions from charcoal production using a combination of IEA data (for 1990–2004) and energy balance data (for 2005–2011) and by applying the aforementioned default EFs, resulting in estimates of 0.03 Gg CH_4 for 1990 and 0.04 Gg CH_4 for 2011. The ERT agrees with the CH_4 emission estimates provided by Austria and recommends that the Party transparently document the methods used to estimate and report CH_4 emissions from charcoal production in its NIR.

Oil and natural gas – CH_4

38. The ERT noted that the calculation method used for estimating CH_4 emissions from oil production changed between 2006 and 2007 due to use of different EFs, and that the new methodology was not applied consistently across the whole time series. The ERT also noted that this results in time-series inconsistency. In response to a question raised by the ERT during the review, Austria clarified that it plans to recalculate the complete time series using the same oil and gas production EF of 0.026 t CH_4/t oil and gas produced, which will result in an increase in the estimated emissions for the early part of the time series by approximately 1 Gg CH_4 and a minor decrease for the latter part of the time series. The ERT welcomes Austria's assessment and recommends that the Party include the results of its assessment in its annual submission.

C. Industrial processes and solvent and other product use

1. Sector overview

39. In 2011, emissions from the industrial processes sector amounted to 11,246.95 Gg CO_2 eq, or 13.6 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 324.20 Gg CO_2 eq, or 0.4 per cent of total GHG emissions. Since 1990, emissions have increased by 11.3 per cent in the industrial processes sector, and decreased by 36.7 per cent in the solvent and other product use sector. The key drivers for the rise in emissions in the industrial processes sector are the increase in the consumption of halocarbons and SF_6, from which emissions have increased by 493.4 per cent since 1990, and the increase in activity in the iron and steel industry, which has led to an increase in emissions from metal production by 15.1 per cent since the base year. Meanwhile, emissions from mineral products and chemical industry have decreased by 7.5 and 53.8 per cent, respectively. Within the industrial processes sector, 51.5 per cent of the emissions were from metal production, followed by 26.9 per cent from mineral products, 15.4 per cent from consumption of halocarbons and SF_6 and 6.2 per cent from chemical industry. With regard to solvent and other product use, the main drivers for the decrease in emissions are the decreasing use of solvents as a result of legal measures and the decreasing use of N_2O.

40. Austria has in place sector-specific QA/QC procedures, which are described in the NIR at the category level. Austria indicated that, after the inventory work had been completed, and in addition to the yearly QA/QC checks, the Party performed an in-depth verification activity, validating the estimates of emissions from the consumption of halocarbons and SF_6 and from SF_6 used in aluminium and magnesium foundries. Specific actions included the development of a new model for estimating emissions from industrial

refrigeration, supermarkets (refrigeration), other commercial refrigeration and stationary air-conditioning, and the revision of the estimation of AD and EFs for the other subcategories (domestic refrigeration, manufacturing of refrigeration equipment, room air-conditioning, heat pumps, transport refrigeration, mobile air-conditioning, foam blowing, fire extinguishers, aerosols, semiconductor manufacturing, electrical equipment for transmission of electricity, soundproof glazing, car tyres, sport shoe soles, particle accelerators, aluminium cleaning and magnesium casting). On the basis of the description of those activities included in the NIR and the information that Austria provided during the review in response to questions raised by the ERT, the ERT concludes that Austria has improved the accuracy of the emission estimation for the entire sector, and has also improved the time-series consistency for the subcategory refrigeration and air-conditioning equipment. The ERT commends the Party for those improvements.

41. Following recommendations made in previous review reports, Austria included in its NIR:

(a) Information on the raw meal used in cement production, including calcium carbide and magnesium carbide contents;

(b) Detailed information on the abatement technology used by the nitric acid producing companies to reduce N_2O emissions, including the reductions of the implied emission factors (IEFs) as a consequence of the different catalyst installed from 2001 to 2011;

(c) More information on the QC checks on the N_2O measurements carried out by the nitric acid producing plants, using international studies and best available technologies as a basis for comparison;

(d) Information on how the plant operators estimate emissions from electric arc furnaces under the EU ETS, using a methodology based on a mass balance approach, in accordance with the Austrian Ordinance (Bundesgesetzblatt, 2007).

42. The ERT commends the Party for such actions, which have improved transparency.

2. Key categories

Lime production – CO_2

43. Austria reported in its NIR the production of lime as part of the process of sugar production. The Party also reports that CO_2 is added to the lime (CaO), which reacts to form calcium carbonate ($CaCO_3$), and it indicates that this process represents a CO_2 sink. During the review, the ERT noted that the information presented in the NIR was not sufficient to demonstrate that all of the CO_2 emitted during the calcination of $CaCO_3$ is completely sequestrated in the produced lime. In response to a question raised by the ERT during the review, Austria provided information explaining that there are two sugar producers in the country, which use the same production process, and that the CO_2 produced during the calcination process is not emitted into the atmosphere because the exhaust gases are collected in a closed system and re-injected into the reactor together with the lime. The Party also explained that, to ensure a complete conversion, an additional source of CO_2 is added from coke combustion, and the corresponding emissions are reported in the energy sector under the category manufacturing industries and construction. On the basis of that information, the ERT concluded that the complete sequestration of the CO_2 resulting from lime production occurs in Austria. The ERT recommends that Austria include a clear description of the process in its NIR, including a mass balance with data on the lime produced, the CO_2 produced by calcination, the coke consumed and the mass of

the $CaCO_3$ produced. Moreover, the ERT strongly recommends that Austria include in its NIR a description of the use of the total amount of $CaCO_3$ obtained.

Consumption of halocarbons and SF_6 – HFCs, PFCs and SF_6

44. Austria indicates in its NIR that it estimates HFC, PFC and SF_6 emissions from consumption of halocarbons and SF_6 for the entire time series using EFs obtained on the basis of the respective industries' expert judgement, except for emissions from aerosols and solvents, for which IPCC default EFs were used. AD were obtained from importers, end-users and expert judgement for the years for which such information was available, and the time series were completed using interpolation or extrapolation techniques. The ERT notes that, for some subcategories, Austria indicates which data were collected and which data were interpolated or extrapolated, as is the case for domestic air-conditioning (using AD for the period 2000–2008 based on expert judgement), metered dose inhalers (MDI) (using detailed data on the imported equipment for the period 2000–2011), transport refrigeration (using data for 2004 and 2008), mobile air-conditioning in passenger cars, trucks and agricultural machines (using data for 2003, 2008, 2009, 2010 or 2011, depending on the type of vehicle), aerosols (using data for 2000, 2003 and 2008) and solvents (using data for 2001 and 2002). Nevertheless, for some other subcategories information on which data were collected and which data were interpolated or extrapolated is not clear, as is the case for heat pumps, mobile air-conditioning in buses, fire extinguishers, semiconductor manufacture, electrical equipment, noise insulation windows and shoes. The ERT recommends that Austria clearly indicate in the NIR the years for which data are collected and for which data are extrapolated for all subcategories.

45. The ERT also notes that for MDIs, aerosols and solvents the Party specifies in the NIR the use of its gross domestic product (GDP) as the driving variable to interpolate or extrapolate AD, but for all other subcategories Austria does not specify in the NIR the interpolation or extrapolation methods used. The ERT recommends that Austria include in the NIR a description of the interpolation and extrapolation methods applied for all subcategories.

3. Non-key categories

Other (chemical industry) – CO_2

46. In its NIR, Austria specifies that ammonia (NH_3), urea and fertilizers are produced in an integrated plant and also that melamine is produced in the country. Austria calculates CO_2 emissions from NH_3 production using the following methodology:

(a) Estimating the total CO_2 produced, using as AD natural gas consumption and as EF the carbon content of the gas;

(b) Subtracting the amount of CO_2 emitted in urea production;

(c) Subtracting the amount of CO_2 captured during the production of melamine.

47. The ERT notes that Austria did not subtract the amount of CO_2 emitted in fertilizer production for the entire time series (25.75 Gg in 2011). This issue was raised during the review, and Austria agreed with this figure. The ERT concludes, therefore, that this is a case of double counting, as the emissions are accounted for both in NH_3 production and under other (chemical industry). The ERT recommends that Austria subtract the emissions from fertilizers from its estimates of CO_2 emissions from NH_3 production.

D. Agriculture

1. Sector overview

48. In 2011, emissions from the agriculture sector amounted to 7,577.10 Gg CO_2 eq, or 9.1 per cent of total GHG emissions. Since 1990, emissions have decreased by 11.4 per cent. The key drivers for the fall in emissions are the decrease in animal population, particularly cattle, and the decrease in the use of synthetic fertilizers. Within the sector, 42.4 per cent of the emissions were from enteric fermentation, followed by 41.1 per cent from agricultural soils and 16.5 per cent from manure management, while emissions from field burning of agricultural residues were less than 0.1 per cent.

49. In response to recommendations made in previous review reports the Party provided in its NIR more detailed explanations for the methane conversion factor (MCF) and N_2O EF used for cattle and swine for manure management of deep bedding with no mixing of manure, and an explanation for the use of the notation key "NO" (not occurring) to report N_2O emissions from cultivation of histosols. However, the ERT assessed that not all of the explanations provided are sufficient and reiterates the recommendation made in the previous review report that the Party, in order to improve transparency, include in the NIR: a clear presentation of the gross energy intake and volatile solid excretion rates associated with suckling cows; information on the derivation of the share of manure digested in biogas plants; and values for the fraction of livestock manure handled using animal waste management systems (AWMS) for all animal subcategories considered in the emission estimates. The ERT recommends that all country-specific data be presented in the NIR in the tables for all reporting years, briefly indicating the sources of such data.

50. The information provided in the CRF tables is consistent and mostly accurate; however, information has not been always provided in the background tables. In CRF table 4.B(a) allocation data for sheep, goats, horses, poultry and other livestock (deer) are missing for all reported years, while the reported data on animal weight for dairy cattle in CRF tables 4.A and 4.B(a) (a constant value of 700.00 kg has been used over the entire reporting period) are not the same as were used in the model for the calculation of CH_4 emissions from enteric fermentation and manure management. The ERT recommends that Austria improve the transparency and accuracy of the information provided in the CRF tables and report data on AWMS for all animal categories and corrected data on weight for dairy cattle in its annual submission.

2. Key categories

Direct soil emissions – N_2O

51. Austria has reported nitrogen (N) input from manure applied to soils reduced for the N emitted as N_2O during manure management in its NIR (tables 192 and 193) and in CRF table 4.D, and has indicated the methodology to be tier 1b. The ERT considered that this was not in accordance with section 4.7.1.1 of the IPCC good practice guidance because no subtraction of N previously emitted from manure management as N_2O is recommended in such a case. In response to a question raised by the ERT during the review regarding the potential underestimation of N_2O emissions from animal manure applied to soils, Austria explained that the methodology used is country-specific and is based on the N-flow approach. The ERT considered this to represent a potential underestimation of emissions and the issue was included in the list of potential problems and further questions raised by the ERT. In response to that list, Austria provided a detailed description of its N-flow model, which it has been using for its reporting to the UNFCCC and the United Nations Economic Commission for Europe's (UNECE) Convention on Long-range Transboundary Air Pollution (LRTAP) consistently since 2003, as well as additional explanations to

demonstrate that the emissions were not underestimated. The ERT concluded that the information provided by Austria is sufficient and recommends that Austria include more detailed descriptions of the country-specific method and N-flow model in its annual submission.

Indirect soil emissions – N_2O

52. Austria has reported N from fertilizers, animal manure and sewage sludge that is lost through leaching and run-off reduced for the N emitted as N_2O, nitrogen oxides (NO_X) and NH_3 during manure management in its NIR (page 319) and in CRF table 4.D, and has indicated the methodology to be tier 1b. The ERT considered that this was not in accordance with section 4.8.1.1 of the IPCC good practice guidance because no subtraction of N is recommended in such a case. In response to a question raised by the ERT during the review regarding the potential underestimation of N_2O emissions for nitrogen leaching and run-off, Austria explained that the methodology used is country-specific and is based on the N-flow approach. The ERT considered this to represent a potential underestimation of emissions and the issue was included in the list of potential problems and further questions raised by the ERT. In response to that list and further questions raised by the ERT, Austria provided a detailed description of its N-flow model, which it has been using for its reporting to the UNFCCC and the UNECE/LRTAP Convention consistently since 2003, as well as additional explanations to demonstrate that the emissions were not underestimated. The ERT concluded that the information provided by Austria is sufficient and recommends that Austria include more detailed descriptions of the country-specific method and N-flow model in its next annual submission.

3. Non-key categories

Manure management – N_2O

53. For the calculation of N_2O emissions from manure management for sheep, goats, horses and other animals, the AWMS distributions were obtained from expert judgement. On page 284 of the NIR the Party indicated that revised data resulting from the inventory revisions in 2009 show an increasing trend for solid and a decreasing trend for pasture. In its calculations Austria did not use revised data and the AWMS distributions have been kept constant over the entire reporting period. To improve accuracy, the ERT recommends that the Party investigate the revised data from 2009 as well as the results of the agriculture survey carried out in 2010 and improve the AWMS distribution for sheep, goats, horses and other animals reported.

54. Austria has reported emissions from mules and asses under horses and in CRF table 4.B(b) the notation key "IE" has been used for mules and asses for all AWMS. To improve accuracy, the ERT recommends that Austria report "IE" only for the relevant AWMS which have been used for mules and asses, and use the notation key "NO" for the remaining systems.

E. Land use, land-use change and forestry

1. Sector overview

55. In 2011, net removals from the LULUCF sector amounted to 3,491.28 Gg CO_2 eq. Since 1990, net removals have decreased by 64.8 per cent. The key driver for the fall in removals is the decrease in the carbon stock in forest land remaining forest land due to an increase in timber harvest. Within the sector, removals of 5,362.78 Gg CO_2 eq were from forest land, followed by emissions of 564.05 Gg CO_2 eq from cropland, emissions of 362.92 Gg CO_2 eq from grassland and emissions of 353.61 Gg CO_2 eq from wetlands.

Other land accounted for emissions of 333.16 Gg CO_2 eq. The remaining emissions of 257.76 Gg CO_2 eq were from settlements.

56. Austria provides transparent information on all categories and carbon pools. The use of AD, the methodologies used and calculation steps are transparently described in the NIR. The ERT noted that the Party has included extra documentation showing soil organic carbon (SOC) changes are estimated for cropland and grassland, as recommended in the previous review report. The ERT welcomes such improvements but encourages the Party to further improve transparency, particularly in relation to the description of the tier 3 models used, such as the YASSO model used to estimate mineral SOC changes in forest soils. The YASSO model uses outputs derived from the National Forest Inventory (NFI) plot data, such as litter, dead stumps and fine roots. However, Austria does not transparently describe the relationship between the outputs of the NFI and the inputs into the YASSO model, nor does it demonstrate that entropy (carbon mass balance) is maintained. The ERT recommends that the Party provide more detailed information regarding the definition of all carbon pools and how balanced carbon flows are maintained between model system boundaries to show that double counting is avoided when the YASSO model is used.

57. The ERT notes that the estimation of all land-use transition matrices for 1990–2011 is based predominately on NFI sample plots of the entire country conducted over four separate sampling periods at an interval of four to seven years. Additional AD are used and applied in a hierarchical manner to ensure that land-use change matrices are estimated in line with the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). The resulting time-series emission/removal trends for the LULUCF sector show clear "step changes" for periods of several years, particularly evident when new inventory information is used. The ERT acknowledges that this is due purely to the nature of the sampling approach adopted by the Party. The ERT also acknowledges that methods are employed to convert periodic means to annual values, based on more detailed annual AD, to ensure that time-series consistency is addressed. The ERT further acknowledges the use of such approaches to improve time-series consistency and considers that information is transparently provided to explain the inter-annual variations. However, the ERT considers that there are still clear "step changes" in emissions/removals over the time series, which are a result of the sampling interval between inventory years. This may not accurately describe year-to-year variations in the emission/removal trends. The ERT encourages the Party to further develop a methodology to derive more detailed information regarding annual changes in land-use areas to ensure a more accurate estimation of emission/removal trends across the time series for future annual submissions.

58. A 20-year transition period is used for the construction of the land-use change matrix. This is in line with the IPCC good practice guidance for LULUCF. However, it was difficult for the ERT to understand the relationship between forest land conversions reported under the Convention and afforestation, reforestation and deforestation activities reported under the Kyoto Protocol. In response to questions raised by the ERT during the review, the Party provided transparent information showing the relationship between the areas reported under both the Convention and the Kyoto Protocol. The ERT recommends that Austria include such information in its annual submission.

59. A tier 2 Monte Carlo uncertainty analysis is performed for all of the LULUCF categories. The ERT welcomes the additional detailed documentation provided in the NIR to describe the assumptions used for the non-forest LULUCF categories, following a recommendation made in the previous review report. It is noted that the uncertainties for the LULUCF sector are large, particularly in relation to carbon stock change (CSC) in mineral soils. The ERT encourages the Party to use the uncertainty analysis to prioritize the

aspects of the inventory that require refinement, in order to improve accuracy and possibly to reduce the overall uncertainty of the LULUCF inventory.

2. Key categories

Forest land remaining forest land – CO_2

60. The NIR states that emissions/removals from "forests not in yield" are assumed to be zero and, therefore, reported as "NA" (not applicable) in the CRF tables. However, no information is provided in the NIR justifying the underlying assumption that the CSC for this pool is zero. In response to questions raised by the ERT during the review, it was established that such forests are not harvested for timber but they are managed for forest protection. In addition, the Party indicated that CSC in "forests not in yield" cannot be estimated until the next full NFI survey data are available. The ERT reiterates the recommendation made in the previous review report that the Party provide estimates of the CSC for "forests not in yield" using best available data. Alternatively, the Party should provide information justifying the assumption that the CSC for 'forests not in yield' is zero and report this as "NA" in its annual submission.

Land converted to forest land and grassland – CO_2

61. A methodology from the IPCC good practice guidance for LULUCF is used together with country-specific SOC reference values to calculate the CSC in mineral SOC. The reference mineral SOC values for forest land and grassland typically vary from approximately 70–139 t C/ha across all regions. However, the reference mineral SOC stock for drained flooded land is assumed to be zero. As a result, Austria reports the highest IEF for SOC carbon stock change in land-use transitions to and from wetlands (4.54–6.56 Mg C/ha/year) when compared with all other reporting Parties. In response to questions raised by the ERT during the review, the Party indicated that a zero value is used because there is no relevant guidance provided in the IPCC good practice guidance for LULUCF. However, the ERT considers that this assumption is not realistic since a growth medium is required for vegetation to grow when drained reservoirs are converted to forest land and grassland. In addition, it is unlikely that all SOC is oxidized when lands are flooded due to anaerobic conditions in the submerged soil profile and the deposit of organic sediment over time. As a result, the ERT considers that SOC CSC for drained waterbodies converted to and from forest land and grassland has been overestimated. During the review, the Party agreed that the reference SOC value for drained waterbodies requires revision to better reflect a more accurate assessment of the stock changes in SOC for converted wetland areas. Therefore, the ERT recommends that the Party refine the methodology used for determining SOC stocks of drained waterbodies to ensure that SOC removals for the subsequent land uses are not overestimated.

3. Non-key categories

Grassland remaining grassland – CO_2

62. The Party reports the area of, and emissions from, organic soils on grassland as "IE" under mineral soils in CRF table 5.C.1 (grassland remaining grassland). The Party indicates that this CSC is included under mineral soils for grassland remaining grassland. However, Austria does provide AD for the area of organic soils and shows how the associated emissions are calculated in the NIR. During the review, the Party indicated that the area of, and emissions from, organic soils will be reported separately in table CRF 5.C.1 in its next annual submission. The ERT reiterates the recommendation made in the previous review report that the area of, and emissions from, organic soils be reported separately to improve transparency.

Biomass burning – CO_2, N_2O and CH_4

63. Emissions of N_2O and CH_4 from burning of biomass residues in viniculture are reported under the agriculture sector in the NIR. However, CO_2 emissions from burning of cropland residues are reported as "NO" under the LULUCF sector. In response to questions raised by the ERT during the review, the Party provided clarification that the burning of perennial biomass residues does occur in viniculture and that all biomass losses for perennial crops at the end of a rotation are estimated and assumed to be immediately oxidized. Therefore, CO_2 emissions from the burning of such residues are estimated, but should be reported as "IE", instead of "NO", under biomass carbon stock change under cropland remaining cropland. The ERT recommends that the Party report CO_2 emissions from fires as "IE" under biomass under cropland remaining cropland and N_2O and CH_4 emissions as "IE" under the agriculture sector in its next annual submission.

F. Waste

1. Sector overview

64. In 2011, emissions from the waste sector amounted to 1,708.31 Gg CO_2 eq, or 2.1 per cent of total GHG emissions. Since 1990, emissions have decreased by 52.4 per cent. The key driver for the fall in emissions is the implementation of waste management policies, resulting in a decreasing amount of degradable organic carbon (DOC) in disposed waste. Within the sector, 73.3 per cent of the emissions were from solid waste disposal on land, followed by 16.9 per cent from wastewater handling, 9.6 per cent from other (waste) and 0.1 per cent from waste incineration.

65. Improvements in comparison with previous annual submissions have been made in terms of enhancing the transparency of the reporting on AD (e.g. waste type considered and DOC in residual waste), EFs (e.g. CH_4 generation potential of residual waste and MCF for the estimation of CH_4 emissions from wastewater handling) and the methodology for the estimation of emissions from other (waste). The ERT commends the efforts made by the Party.

2. Key categories

Solid waste disposal on land – CH_4

66. The ERT noted that a rationale for the significant reduction in the CH_4 IEF between 2010 (262.6 kg/Mg) and 2011 (218.3 kg/Mg) presented in table 258 of the NIR was not clearly provided. In response to a recommendation made in the previous review report, Austria provided, in the NIR (table 261) the time series of DOC and L_o (methane generation potential) of residual waste. Nevertheless the ERT note that this information does not reflect the carbon content of the disposed waste in 2011. In response to a question raised by the ERT during the review, the Party provided detailed information regarding the amount of solid waste disposed at solid waste disposal sites and calculated the associated emissions using the disposed waste composition categorized by waste component. The ERT considers that information on annual waste composition could justify a reduction in DOC of disposed waste in 2011, as the increased waste amount disposed of in 2011 compared with that in 2010 was composed mainly of inert waste, resulting in the lower DOC of disposed waste in 2011. The ERT recommends that Austria present time-series information on DOC and L_o of non-residual waste to improve the transparency of its reporting.

67. Austria has reported in its NIR (page 423) that the CH_4 concentration in recovered landfill gas decreased from 48 per cent in 2002 to 45 per cent in 2007 but that the same CH_4 concentration as in 2007 was assumed for 2008–2011. The ERT considers that this may

represent a lack of accuracy in relation to recovered CH_4. In response to a question raised by the ERT during the review, the Party explained that the actual CH_4 concentration in recovered landfill gas during 2008–2011 will be derived from a new study, which will only be available in November 2013 and that the new collected data will be implemented and the time series recalculated in the next annual submission. Austria also explained that a CH_4 concentration of 55 per cent (default value) was used for the estimation of CH_4 production. The ERT welcomes the effort made by Austria to update its reporting of CH_4 concentrations in recovered landfill gas on a regular basis and recommends that the Party provide information on recovered landfill gas calculated using an updated methane concentration in the NIR.

3. Non-key categories

Wastewater handling – CH_4

68. Austria has used the methodology recommended in the IPCC good practice guidance to estimate CH_4 emissions from inhabitants using septic tanks. In that context, a country-specific MCF of 0.27 based on studies conducted outside of Austria[6] was used. During the review the ERT questioned the applicability of the MCF to the Austrian conditions and in response Austria explained that the Party has comparatively assessed the MCF value adopted (0.27) against a recently reported MCF value of 0.22,[7] which is based on field measurements under similar temperature conditions. The ERT notes that using an MCF value of 0.27 implies higher emissions that those that would have been obtained using an MCF value of 0.22 as that reported by Diaz-Valbuena et al (2011). The ERT considers that the additional explanation is satisfactory and recommends that the Party provide this explanation for the use of an MCF value of 0.27 in the next NIR.

Waste incineration – CO_2, CH_4 and N_2O

69. Austria estimated CO_2, CH_4 and N_2O emissions from municipal waste, clinical waste and waste oil incineration using the amount of incinerated waste and country-specific EFs for the whole time series. The ERT noted that the quantity of clinical waste and waste oil sent to the incinerators in 2010 and 2011was the same (500 Mg for each waste type). In response to a question raised by the ERT during the review, Austria explained that in 2005 a national regulation came into force which limits waste incineration and waste co-incineration. Each of the eight waste incineration companies is assumed to have installations with a capacity of 60.8 t waste oil/year. This is the same average capacity that has been used for estimating the waste oil quantity for 1990 to 2005. This results in a rounded value of 500 Mg waste oil/year. One hospital still has a permit to incinerate waste (capacity < 2 t/hour), and these emissions are reported by Austria in the waste sector, and the emission estimation was made assuming no energy recovery because it is not known if and how the energy is used. Assuming a capacity of 1 Mg/hour and 500 hours yearly operating time, it was estimated to be 500 Mg/year. The ERT recommends that Austria add this background information on the estimation of clinical and waste oil quantity to improve the transparency of the reporting.

[6] GibbsMJ and Woodbury JW. 1993. *Methane and Nitrous Oxide: Methods in National Emissions Inventories and Options for Control: Proceedings*, ed. AR van Amstel, 81–90. Amersfoort, The Netherlands, 3–5 February 1993.

[7] Diaz-Valbuena et al. 2011. Methane, carbon dioxide, and nitrous oxide emissions from septic tank systems, *Environmental Science and Technology*. 45. pp. 2741–2747.

G. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

1. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Overview

70. Table 6 provides an overview of the information reported and parameters selected by Austria under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 6
Supplementary information reported under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

		Findings and recommendations
Has the Party reported information in accordance with the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1?	Not sufficient	All requirements met except those specified in paragraphs 6(e) and 8(b) of the annex to decision 15/CMP.1 (see paras. 72, 73, 76 and 77 below)
Identify any elected activities under Article 3, paragraph 4, of the Kyoto Protocol	None	
Identify the period of accounting	Commitment period accounting	
Assessment of the Party's ability to identify areas of land and areas of land-use change	Not sufficient	Information to meet requirements specified in paragraphs 18 and 19 of the annex to decision 16/CMP.1 is not sufficient (see paras. 72 and 74 below)

71. The ERT notes that Austria has made significant improvements since the last in-country review and following subsequent reviews relating to the provision of information to demonstrate that activities under Article 3, paragraph 3, of the Kyoto Protocol are directly human-induced, as required by paragraph 8(a) of the annex to decision 15CMP/1, including:

(a) Providing an overview of the Forest Act and how it relates to forest establishment;

(b) Showing how NFI information demonstrates that regenerated forest meets the forest and forest management definition specified in the Forest Act;

(c) Showing how nature-protected forests qualify as forests under the Forest Act.

72. The ERT considers that Austria clearly demonstrates that activities under Article 3, paragraph 3, of the Kyoto Protocol are directly human-induced. However, the ERT noted that many of the other specified requirements pursuant to relevant decisions have not been addressed in the NIR (see paras. 73, 74 and 76 below). During the in-country review the Party presented an improvement plan using the new afforestation and reforestation, and deforestation (ARD) NFI 2011/2013 survey to show how those requirements will be met in accordance with the annexes to decisions 15/CMP.1 and 16/CMP.1 in the next annual submission. The ERT welcomes those planned improvements and strongly recommends that the plan be implemented.

73. In response to questions raised by the ERT during the review, Austria presented preliminary findings from the ARD NFI 2011/2013 survey cluster plots, which show short-term or "oscillating changes" between forest cover and no forest cover along forest borders, which are not reported as deforestation. The ERT is concerned that such transitions could potentially represent deforestation, meaning that the areas should be reported and accounted as deforestation and that CSCs in the areas should continue to be reported as deforestation land for the remaining and successive commitment periods. The ERT noted that the Party does not provide sufficient information defining the time threshold required to show how harvesting or forest disturbance and re-establishment of forests are distinguished from deforestation, which is required by paragraph 8(b) of the annex to the decision 15/CMP.1. In response to questions raised by the ERT during the review, the Party indicated that the time period threshold would be defined in the next annual submission, on the basis of the Forest Act. The ERT strongly recommends that those new criteria be reported and applied to "oscillating change areas", and if the time period threshold is exceeded or there is a clear indication of land-use change, then those areas should be reported under Article 3, paragraph 3, of the Kyoto Protocol deforestation activities and remain under this activity for the remaining and subsequent commitment period.

74. The ERT notes that the simple interpolation methods used (i.e. between NFI 1986/1990 and 1992/1994) are not accurate enough to demonstrate that elected afforestation, reforestation and deforestation activities began on or after 1 January 1990. This is not in line with the accounting requirement set out in paragraph 18 of the annex to decision 16/CMP.1. The ERT strongly reiterates the recommendations made in previous review reports that Austria improve the data and methodologies used for the calculation of activities under Article 3, paragraph 3, of the Kyoto Protocol using best available data and ensure that the time-series data for the first commitment period are reconstructed to meet the reporting requirements in decision 16/CMP.1.

75. No uncertainty analysis was provided for activities elected under Article 3, paragraph 3, of the Kyoto Protocol; however, the Party, in response to questions raised by the ERT during the review, indicated that an uncertainty analysis is included in the improvement plan presented to the ERT during the review. The ERT reiterates the recommendation made in previous review reports that the Party include an uncertainty analysis for KP-LULUCF activities.

Activities under Article 3, paragraph 3, of the Kyoto Protocol

Afforestation and reforestation – CO_2

76. The ERT notes that the deadwood pool is not reported, under the assumption that the pool cannot be a source given the age-class structure of the afforestation areas. However, the Party has not provided any information or data to demonstrate that the deadwood pool is not a source. In response to questions raised by the ERT during the review, Austria did indicate that new afforestation and reforestation, and deforestation NFI 2011/2013 survey data will be used to estimate carbon stock changes for the deadwood pool for the next annual submission. The ERT welcomes the planned improvement and strongly reiterates the recommendation made in previous review reports that the Party provide estimates for the deadwood pool or demonstrate that the pool is not a source.

77. Biomass emissions associated with settlement conversion to afforested land are reported as "IE". However, following consultation with the Party during the review, it was established that such biomass losses are not estimated under KP-LULUCF, but are estimated and reported under the LULUCF sector under the Convention. Failure to report the emissions results in an underestimation of emissions from the removal of tree biomass from settlement areas prior to afforestation. In response to questions raised by the ERT during the review, Austria indicated that new information from the ARD NFI 2011/2013

survey will provide the basis for detailed biomass gain and loss estimations for all land-use conversions to forest for the next annual submission. The ERT welcomes the planned improvement and strongly recommends that the Party report biomass losses associated with afforestation of settlement areas or demonstrate that the biomass pool is not a net source.

78. Austria uses the assumption that reference mineral SOC stocks for drained waterbodies are zero (see para. 61 above). The use of that assumption and the application of the data and methods to afforested wetland areas means that removals from mineral soils are overestimated. The ERT recommends that the Party refine and report in its NIR the methodology used for determining SOC stocks of drained waterbodies to ensure that SOC removals from afforested mineral soils are not overestimated.

Deforestation – CO_2

79. CO_2 emissions resulting from lime application to deforested cropland and grassland are not reported for the KP-LULUCF sector. According to the NIR, 40 per cent of cropland and grassland require application of lime, which is based on the expert judgement of the Austrian advisory committee for good agricultural practices. In response to questions raised by the ERT during the review, the Party confirmed that deforested cropland and grassland is also subject to lime application, using the same assumptions as applied in the reporting on LULUCF under the Convention. The ERT strongly recommends that the Party estimate and report CO_2 emissions resulting from lime application to deforested cropland and grassland.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

80. Austria has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings and recommendations included in the standard independent assessment report (SIAR) on the SEF tables and the SEF comparison report.[8] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10. The ERT reiterated the recommendations contained in the SIAR including the strong recommendation that the Party test each release thoroughly against the data exchange standards (DES) as part of each major release cycle and provide the complete results in the NIR of its next annual submission and further recommends that, following major changes, the Party provide a data model which contains all DES required entities complete with descriptions in the NIR of its next annual submission. Both recommendations are the result of problems with the centralization of the national registry into a single European Union (EU) registry. In response to questions raised by the ERT during the review, Austria provided information stating that the additional description of database structure and the complete reporting of test results have already been submitted to the secretariat.

81. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with decision 15/CMP.1, annex, chapter I.E, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements referred to in decision 22/CMP.1, annex, paragraph 88(a–j). The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the

[8] The SEF comparison report is prepared by the international transaction log (ITL) administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

Calculation of the commitment period reserve

82. Austria has reported its commitment period reserve in its 2013 annual submission. Austria reported that its commitment period reserve has not changed since the initial report review (309,479,408 t CO_2 eq) as it is based on the assigned amount and not the most recently reviewed inventory.

3. Changes to the national system

83. Austria reported that there are no changes in its national system since the previous annual submission. The ERT concluded that the Party's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

4. Changes to the national registry

84. Austria reported that there are changes in its national registry since the previous annual submission. The Party described the changes, specifically due to the centralization of the EU ETS operations into a single European Union registry operated by the European Commission called the Consolidated System of European Union Registries (CSEUR), in its NIR (page 478). The CSEUR is a consolidated platform that implements the national registries in a consolidated manner and was developed together with the new EU registry.

85. The ERT noted that there were recommendations in the SIAR that had not been addressed related to the CSEUR, in particular recommendations related to reporting a description of the changes in database structure and reporting of test results. In response to questions raised by the ERT during the review, Austria provided information stating that the additional description of database structure and the complete reporting of test results have already been submitted to the secretariat.

86. The ERT concluded that, taking into account the confirmed changes in the national registry, including additional information provided to the ERT during the review, Austria's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP). With respect to the provision of information related to database structure specifically, the ERT encourages the Party to provide additional information in the NIR. The ERT recommends that Austria include all other additional information in response to the SIAR findings in its NIR in accordance with decision 15/CMP.1, annex, chapter I.G.

5. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

87. Austria reported that there are changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, since the previous annual submission and it described the changes made in its NIR. The Party states that it strives to phase out market imperfections that run counter to the objectives of the Convention. The ERT concluded that, taking into account the confirmed changes in the reporting, the information provided is complete and transparent. To improve transparency, the ERT recommends that Austria more clearly indicate in the NIR where reported information has changed since the last annual submission.

88. Austria has reported improvements in its policies to eliminate potential negative impacts, including new fiscal incentives. Specific actions include:

(a) Increasing the bonus price for newly authorized automobiles with CO_2 emissions lower than 120 g/km;

(b) Increasing the bonus price for alternatively fuelled vehicles, both hybrid and natural gas operated;

(c) Increasing the tax on newly authorized automobiles with CO_2 emissions greater than 160 g/km;

(d) Increasing the fees for all flights starting from an Austrian airport.

89. Austria has also reported the inclusion of aviation in the EU ETS, by which the airlines receive tradable allowances covering a certain level of CO_2 emissions from their flights per year. In reporting that information, Austria emphasized that most of the flights are taking place either within the EU or between the EU and other industrialized countries.

III. Conclusions and recommendations

Conclusions

90. Table 7 summarizes the ERT's conclusions on the 2013 annual submission of Austria, in accordance with the Article 8 review guidelines.

Table 7
Expert review team's conclusions on the 2013 annual submission of Austria

		Paragraph cross-references
The ERT concludes that the inventory submission of Austria is complete (categories, gases, years and geographical boundaries and contains both an NIR and CRF tables for 1990–2011)		
Annex A sources[a]	Complete	
LULUCF[a]	Not complete	60
KP-LULUCF	Not complete	Table 6 and paras. 73, 74 and 76
The ERT concludes that the inventory submission of Austria has been prepared and reported in accordance with the UNFCCC reporting guidelines	Yes	
The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and reported in accordance with decision 15/CMP.1	Yes	
Austria's inventory is in accordance with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*	Generally yes	14
Austria has reported information on activities under Article 3, paragraphs 3	Yes	71–79

		Paragraph cross-references
and 4, of the Kyoto Protocol		
Austria has reported information on its accounting of Kyoto Protocol units in accordance with decision 15/CMP.1, annex, chapter I.E, and used the required reporting format tables as specified by decision 14/CMP.1	Yes	
The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1	Yes	
The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol	Yes	
Did Austria provide information in the NIR on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol?	Yes	87

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, IPCC = Intergovernmental Panel on Climate Change, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

B. Recommendations

91. The ERT identified the issues for improvement listed in table 8. All recommendations are for the next annual submission, unless otherwise specified.

Table 8
Recommendations identified by the expert review team

Sector	*Category*	*Recommendation*	*Paragraph cross-reference*
Cross-cutting		Perform additional checks to reduce inconsistencies or incorrect use of notation keys	13
		Perform uncertainty analysis considering all the categories of the inventory	14
		Provide a table indicating where the recommendations of the ERT have been addressed	17
Energy	Reference and sectoral approaches	Report the carbon content of gasoil and diesel oil in the reference approach in such a way that the biofuels are considered from the year 2005 onwards, whereby organic carbon from biofuels is accounted for separately	24

Sector	*Category*	*Recommendation*	*Paragraph cross-reference*
		Harmonize IEA data with the reported bottom-up approach to estimate fuel consumption, for jet kerosene and for diesel oil in navigation, and report the corresponding progress.	25, 26
	Stationary combustion: liquid, solid and biomass fuels – CO_2, CH_4 and N_2O	Include a carbon mass balance in the form of a process flow diagram in the reporting of CO_2 emissions from blast furnace gas	28
		Describe transparently that CH_4 emissions from coke production in iron and steel production are collected and used as a fuel source and use the appropriate notation key	29
	Stationary combustion: biomass – CH_4 and N_2O	Describe the methods used to estimate CH_4 and N_2O emissions from charcoal use	31
	Road transportation: – CO_2, CH_4, N_2O	Include an explanation that the fuel consumed for ground activities at airports and harbours is reported under fuel export	33
	Road transportation: – CH_4, N_2O	Revise the modelling approach for CH_4 and N_2O emission estimations from biomass separately from gasoline and diesel oil, and report this	34
	Solid fuel transformation: biomass – CH_4	Describe the methods used to estimate CH_4 emissions from charcoal production	37
	Oil and natural gas: – CH_4	Recalculate the complete time series from CH_4 emissions from oil production using the same oil and gas production emission factor of 0.026 t CH_4/t oil and gas produced	38
Industrial processes and solvent and other product use	Lime production– CO_2	Describe the sugar production process, including a mass balance with data on the lime produced, the CO_2 produced by calcination, the coke consumed, the mass of the $CaCO_3$ produced, and the use of the $CaCO_3$ obtained	43
	Consumption of halocarbons and SF_6– HFCs, PFCs and SF_6	Include a complete description of the model used, indicating (1) the years for the data collected and the years for the data extrapolated or interpolated and (2) the interpolation and extrapolation techniques used for all subcategories	44, 45
	Other (chemical industry) – CO_2	Subtract the emissions from fertilizers in CO_2 emission estimations from NH_3 production	46, 47
Agriculture	Sector	Present a table with all country-specific data for all reporting years including a short indication on the sources	49

Sector	*Category*	*Recommendation*	*Paragraph cross-reference*
	overview	for this data	
		Complete the background CRF tables for the allocation of data for sheep, goats, horses poultry and other livestock for the entire time series and Assure the consistency between the data for animal weight for dairy cattle presented in CRF tables 4.A and 4.B(a) and the data effectively used in the model for the calculation of CH_4 emissions	50
	Direct soil emissions – N_2O	Include a more detailed description of the nitrogen (N)-flow model used to estimate N_2O emissions from animal manure applied to soils.	51
	Indirect soil emissions – N_2O	Include a more detailed description of the N-flow model used to estimate N_2O emissions from fertilizers, animal manure and sewage sludge that is lost through leaching and run-off reduced for the N emitted as N_2O, NO_X, and NH_3 during manure management	52
	Manure management – N_2O	Revise data on AWMS distributions for sheep, goats, horses and other animals reported considering 2009 inventory revisions and 2010 agriculture survey data	53
		Use the notation key "NO" instead of "IE" for the AWMS which have not been used by mules and asses	54
LULUCF	Sector overview	Provide more detailed information regarding the definition of all carbon pools and how balanced carbon flows are maintained between model system boundaries to show that double accounting is avoided when the YASSO model is used	56
		Report transparent information showing the relationship between forest land conversions reported under the Convention and afforestation, reforestation and deforestation activities reported under the Kyoto Protocol	58
	Forest land remaining forest land – CO_2	Report estimates of CSC for "forests not in yield" using best available data, or provide information that CSC for "forests not in yield" is zero and report this as "NA"	60
	Land converted to forest land and grassland – CO_2	Refine the methodology used for determining SOC stocks of drained waterbodies to ensure that SOC removals for the subsequent land use are not overestimated	61
	Grassland remaining grassland – CO_2	Report the area of, and emissions from, organic soils under grassland remaining grassland, under organic soil (CRF table 5C)	62
	Biomass burning – CO_2, N_2O, CH_4	Report emissions of CO_2 from fires as "IE" under biomass under cropland remaining cropland and N_2O and CH_4 as "IE" under the agriculture sector	63

Sector	*Category*	*Recommendation*	*Paragraph cross-reference*
Waste	Solid waste disposal on land – CH_4	Present time-series information on degradable organic carbon and methane generation potential of non-residual wastes	66
		Provide information on recovered landfill gas calculated based on updated methane concentration	67
	Wastewater handling – CH_4	Include the explanation about the applicability of the methane conversion factor used for Austrian conditions	68
	Waste incineration – CO_2, CH_4, N_2O	Include background information on the estimation of clinical and waste oil quantity used	69
KP-LULUCF	Overview	Implement the improvement plan using the new National Forest Inventory 2011/2013 survey to show how all the requirements will be met in accordance with the annexes to decisions 15 CMP/1. and 16 CMP/1	72
		Define the time period threshold applied to "oscillating change areas" and if the time period threshold is exceeded or there is clear indication of land-use change, report these areas under deforestation activities under Article 3, paragraph 3, of the Kyoto Protocol and retain under this activity for the remaining and subsequent commitment period	73
		Improve data and methodologies used for the calculation of activities under Article 3, paragraph 3, of the Kyoto Protocol based on best available data and ensure that the time-series data for the first commitment period are re-constructed to meet the reporting requirements	74
		Include an uncertainty analysis for activities elected under Article 3, paragraph 3, of the Kyoto Protocol.	75
	Afforestation and reforestation – CO_2	Estimate emissions for the deadwood pool or demonstrate that the pool is not a source	76
		Report biomass losses associated with afforestation of settlement areas or demonstrate that this pool is not a source.	77
		Refine and report the methodology used for determining SOC stocks of drained waterbodies to ensure that SOC removals in afforested mineral soils are not overestimated	78
	Deforestation – CO_2	Estimate and report CO_2 emissions resulting from lime application to deforested crop and grassland	79
Information on Kyoto Protocol units		Test each release of the SEF tables thoroughly against the data exchange standards (DES) as part of each major release cycle and provide the complete results	80
		Provide a data model which contains all DES required	

Sector	*Category*	*Recommendation*	*Paragraph cross-reference*
		entities complete with descriptions	
National registry		Include additional information in response to the SIAR findings	86
Article 3, paragraph 14, of the Kyoto Protocol		Show in the NIR where reported information has changed since the last annual submission	87

Abbreviations: AWMS = animal waste management systems, CRF = common reporting format, CSC = carbon stock change, ERT = expert review team, IE = included elsewhere, IEA = International Energy Agency, NA = not applicable, NIR = national inventory report, NO = not occurring, SOC = soil organic carbon, SIAR = standard independent assessment report.

IV. Questions of implementation

92. No questions of implementation were identified by the ERT during the review.

Annex I

Background data on recalculations and information to be included in the compilation and accounting database

Table 9
Recalculations in the 2013 annual submission for the base year and the most recent year

Greenhouse gas source and sink categories	*1990*	*2010*	*1990*	*2010*	*Reason for the recalculation*
	Value of recalculation (Gg CO_2 eq)		*Per cent change*		
1. Energy	1.95	281.55	0.0	0.4	Improved EFs and AD, methodological changes
A. Fuel combustion (sectoral approach)	1.30	317.88	0.0	0.5	
1. Energy industries		–57.71		–0.4	
2. Manufacturing industries and construction	0.10	–158.67	0.0	–1.0	
3. Transport	–0.99	–0.74	0.0	0.0	
4. Other sectors	2.18	535.05	0.0	4.7	
5. Other		–0.00		–0.0	
B. Fugitive emissions from fuels	0.65	–36.33	0.3	–7.0	
1. Solid fuels	0.65	0.77	5.9	NA[a]	
2. Oil and natural gas		–37.10		–7.2	
2. Industrial processes		1.10		0.0	Improved AD, methodological changes
A. Mineral products		0.20		0.0	
B. Chemical industry					
C. Metal production		0.90		0.0	
D. Other production					
E. Production of halocarbons and SF_6					
F. Consumption of halocarbons and SF_6	–4.68	125.59	–1.6	7.8	
G. Other					
3. Solvent and other product use					
4. Agriculture	–1.26	14.11	–0.0	1.9	Improved AD
A. Enteric fermentation		–0.33		–0.0	
B. Manure management	–1.74	9.73	–0.1	0.8	
C. Rice cultivation					
D. Agricultural soils	0.48	4.74	0.0	0.2	
E. Prescribed burning of savannahs					
F. Field burning of agricultural residues		–0.00		–2.3	
G. Other					

Greenhouse gas source and sink categories	1990	2010	1990	2010	Reason for the recalculation
	Value of recalculation (Gg CO_2 eq)		Per cent change		
5. Land use, land-use change and forestry	96.02	93.03	–1.0	–2.5	Improved AD
A. Forest land					
B. Cropland	–5.45	–8.48	–2.7	–1.6	
C. Grassland	96.66	88.00	37.6	31.4	
D. Wetlands					
E. Settlements	4.81	13.51	1.7	5.4	
F. Other land					
G. Other					
6. Waste		–2.04		–0.1	Improved AD
A. Solid waste disposal on land					
B. Wastewater handling		–4.07		–1.4	
C. Waste incineration					
D. Other		2.03		1.3	
7. Other					
Total CO_2 equivalent without LULUCF	–4.00	420.31	–0.01	0.5	
Total CO_2 equivalent with LULUCF	92.02	513.34	0.14	0.6	

Abbreviations: AD = activity data, EF = emission factor, LULUCF = land use, land-use change and forestry, NA = not applicable.
[a] Austria did not report emissions for category 1.B.1 in its previous annual submission.

Table 10
Information to be included in the compilation and accounting database in t CO_2 eq for 2011, including the commitment period reserve

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Commitment period reserve	309 479 408			309 479 408
Annex A emissions for 2011				
CO_2	70 455 489			70 455 489
CH_4	5 361 811	5 363 981		5 363 981
N_2O	5 293 689	5 293 795		5 293 795
HFCs	1 349 006			1 349 006
PFCs	60 071			60 071
SF_6	321 530			321 530
Total Annex A sources	**82 841 596**	**82 843 872**		**82 843 872**
Activities under Article 3, paragraph 3, for 2011				
3.3 Afforestation and reforestation on non-harvested land for 2011	–2 633 464			–2 633 464
3.3 Afforestation and reforestation on harvested land for 2011				
3.3 Deforestation for 2011	1 349 593			1 349 593
Activities under Article 3, paragraph 4, for 2011[c]				
3.4 Forest management for 2011				
3.4 Cropland management for 2011				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2011				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2011				
3.4 Revegetation in the base year				

Abbreviation: Annex A sources = sources included in Annex A to the Kyoto Protocol.
[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 11
Information to be included in the compilation and accounting database in t CO_2 eq for 2010

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2010				
CO_2	72 590 804			72 590 804
CH_4	5 536 078	5 538 020		5 538 020
N_2O	5 184 257	5 184 344		5 184 344
HFCs	1 285 648			1 285 648
PFCs	63 934			63 934
SF_6	351 500			351 500
Total Annex A sources	**85 012 221**	**85 014 249**		**85 014 249**
Activities under Article 3, paragraph 3, for 2010				
3.3 Afforestation and reforestation on non-harvested land for 2010	–2 620 855			–2 620 855
3.3 Afforestation and reforestation on harvested land for 2010				
3.3 Deforestation for 2010	1 365 129			1 365 129
Activities under Article 3, paragraph 4, for 2010[c]				
3.4 Forest management for 2010				
3.4 Cropland management for 2010				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2010				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2010				
3.4 Revegetation in the base year				

Abbreviation: Annex A sources = sources included in Annex A to the Kyoto Protocol.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 12
Information to be included in the compilation and accounting database in t CO_2 eq for 2009

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2009				
CO_2	67 396 947			67 396 947
CH_4	5 624 692	5 627 013		5 627 013
N_2O	5 413 912	5 414 018		5 414 018
HFCs	1 134 264			1 134 264
PFCs	28 640			28 640
SF_6	357 535			357 535
Total Annex A sources	**79 955 991**	**79 958 418**		**79 958 418**
Activities under Article 3, paragraph 3, for 2009				
3.3 Afforestation and reforestation on non-harvested land for 2009	–2 608 246			–2 608 246
3.3 Afforestation and reforestation on harvested land for 2009				
3.3 Deforestation for 2009	1 380 666			1 380 666
Activities under Article 3, paragraph 4, for 2009[c]				
3.4 Forest management for 2009				
3.4 Cropland management for 2009				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2009				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2009				
3.4 Revegetation in the base year				

Abbreviation: Annex A sources = sources included in Annex A to the Kyoto Protocol.
[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 13
Information to be included in the compilation and accounting database in t CO_2 eq for 2008

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2008				
CO_2	73 921 740			73 921 740
CH_4	5 705 513	5 708 021		5 708 021
N_2O	5 695 121	5 695 246		5 695 246
HFCs	1 082 021			1 082 021
PFCs	167 125			167 125
SF_6	390 871			390 871
Total Annex A sources	**86 962 392**	**86 965 025**		**86 965 025**
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for 2008	–2 488 471			–2 488 471
3.3 Afforestation and reforestation on harvested land for 2008				
3.3 Deforestation for 2008	1 364 486			1 364 486
Activities under Article 3, paragraph 4, for 2008[c]				
3.4 Forest management for 2008				
3.4 Cropland management for 2008				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2008				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2008				
3.4 Revegetation in the base year				

Abbreviation: Annex A sources = sources included in Annex A to the Kyoto Protocol.
[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Annex II

Documents and information used during the review

A. Reference documents

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

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Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

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"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories". FCCC/SBSTA/2006/9. Available at <http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>.

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FCCC/ARR/2012/AUT. Report of the individual review of the annual submission of Austria submitted in 2012. Available at <http://unfccc.int/resource/docs/2013/arr/aut.pdf>.

Standard independent assessment report, parts 1 and 2. Available at <http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php>.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Katja Pazdernik (Umweltbundesamt GmbH), including additional material on the methodologies and assumptions used. The following documents[1] were also provided by Austria:

Amon B. et all. 2007. Tierhaltung und Wirtschaftsdüngermanagenment in Österreich, Endbericht, Vienna, Universität für Bodenkultur Wien.

Amon Barbara, Stefan Hörtenhuber. 2010. Revision of Austria's National Grenhouse Gas Inventory, Sector Agriculture, Final Report, Vienna: Universität für Bodenkultur Wien.

Amon, Barbara, G. Moitzi, M. Schimpl, V. Kryvoruchko, C. Wagner-Alt. 2002. Methane, Nitrous Oxide and Amonia Emissions from Management of Liquid Manures, Final Report, Vienna: Universität für Bodenkultur Wien.

Bundesgesetzblatt, 2007, Bundesgesetzblatt für die republik österreich, Verordnung des Bundesministers für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft über die Überwachung, Berichterstattung und Prüfung betreffend Emissionen von Treibhausgasen (Überwachungs-, Berichterstattungs- und Prüfungs- Verordnung - ÜBPV), available at http://www.ris.bka.gv.at/Dokumente/BgblAuth/BGBLA_2007_II_339/BGBLA_2007_II_339.pdf

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M.J. and J.W. Woodbury. 1993. Methane and Nitrous Oxide: Methods in National Emissions Inventories and Options for Control: Proceedings, ed. A.R. van Amstel, 81–90. Amersfoort, The Netherlands, 3–5 February 1993.

Schmied, M 2012. *Development of Emission Factors in Europe – Handbook on Emission Factors of Road* Transport (HBEFA): Workshop "Moving Towards Emission Quantification in urban Transport". Beijing: China.

Winiwater, W., 2007. *Quantifying Uncertainties of the Austrian Greenhouse Gas Inventory*, ARC (Austrian Research Centers) Seibersdorf. Research Report ARC-sys-0154. Final report to project Nr. 1.S2.00116.0. contracted by the Umweltbundesamt.

Winiwater, W., Rydpal, K., 2001. *Assessing the uncertainty associated with national greenhouse gas emission inventories: a case study for Austria*. Atmospheric Environment 35 (2001) 5424-5440.

[1] Reproduced as received from the Party.

Annex III

Acronyms and abbreviations

AD	activity data
AWMS	animal waste management systems
C	carbon
CH_4	methane
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
CSC	carbon stock change
CSEUR	Consolidated System of European Union registries
DOC	degradable organic carbon
EF	emission factor
ERT	expert review team
EU	European Union
EU ETS	European Union Emissions Trading System
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	Statistics Division, FAO
GDP	gross domestic product
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
HFCs	hydrofluorocarbons
iE	included elsewhere
IEA	International Energy Agency
IEC	International Electrotechnical Commission
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization
ITL	international transaction log
kg	kilogram (1 kg = 1,000 grams)
KP-LULUCF	land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
L_0	methane generation potential
LPG	liquefied petroleum gas
LRTAP	Convention on Long-range Transboundary Air Pollution
LULUCF	land use, land-use change and forestry
MCF	methane conversion factor
Mg	megagram (1 Mg = 1 tonne)
N	nitrogen
NO_X	nitrogen oxides
N_2O	nitrous oxide
NA	not applicable
NE	not estimated
NFI	National Forest Inventory
NH_3	ammonia
NIR	national inventory report
NO	not occurring
PFCs	perfluorocarbons
PJ	petajoule (1 PJ = 10^{15} joules)

QA/QC	quality assurance/quality control
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
SOC	soil organic carbon
TJ	terajoule (1 TJ = 10^{12} joules)
UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nations Framework Convention on Climate Change